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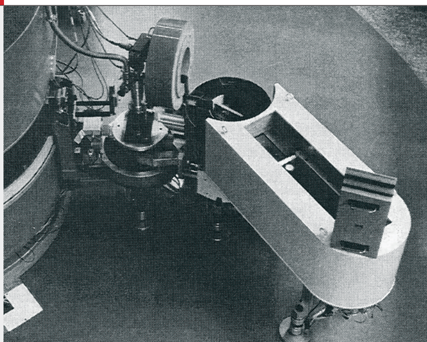
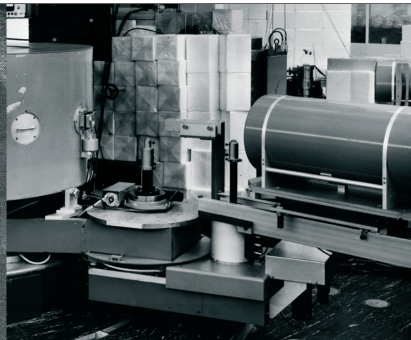
SWISS NEUTRON NEWS





Schweizerische Gesellschaft für Neutronenstreuung
Société Suisse pour la Diffusion des Neutrons
Swiss Neutron Scattering Society

EDITORIAL:

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ON THE COVER:

Three-axis spectrometers at reactor Saphir (top left), at reactor Diorit (top right), and EIGER at SINQ (bottom), see related article by A. Furrer.

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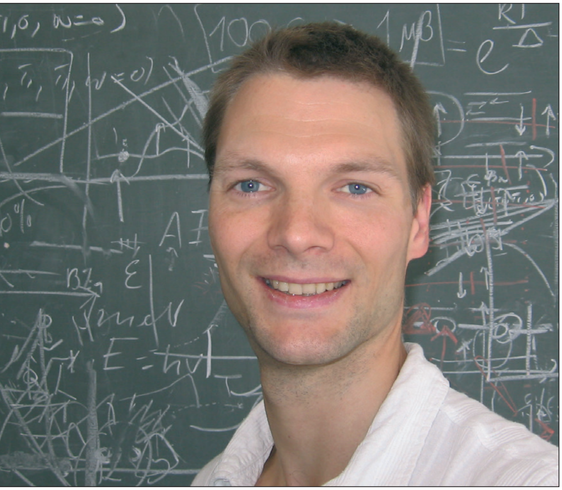

DEAR MEMBERS

Welcome to this issue of Swiss Neutron News. From the general assembly in November 2013 I can report a couple of developments for the Swiss Neutron Scattering Society (SGN). Firstly it has been decided to institute a young scientist prize. The first call for nominations can be found in this issue of Neutron News. Secondly, there will be a session dedicated to Frontier Experiments with Neutrons at the annual meeting of the Swiss Physical Society (SPS) in Fribourg 30th of June to 2nd of July, during which the first young scientist prize will be awarded. Details of the SPS annual meeting and the topical session can be found here (http://www.sps.ch/en/events/sps_annual_meeting_2014/program_overview/). We invite abstracts especially from young scientists from all fields of science where neutron scattering is being used. Thirdly, the Swiss Neutron Scattering Society has obtained status as an association pursuing public and charitable purposes, which implies that contributions and donations to the society are now tax deductible.

Finally, it was decided to increase the annual membership fee from 10CHF to 20CHF, which combined with a kind reminder to our members will hopefully allow the society to continue and expand activities like the above mentioned initiatives (Please see http://sgn.web.psi.ch/sgn/address_form.html for info on joining and contributing to the society).

Of additional news, it is with pleasure I can report that the next 5 year agreement for Swiss membership of Institut Laue Langevin (ILL) is very close to being signed, and Switzerland continues to be a very active contributor to the European Spallation Source (ESS) project on many levels and through dedicated efforts by many of our colleagues – from sophisticated instrument and machine design work packages, via participation in several of the committees required to launch such a complex project, to an excellent engagement and support by our State Secretariat for Education, Research and Innovation (SERI).

With this, I wish everyone an excellent 2014!

Henrik M. Ronnow

On the History of Neutron Spectrometers in Switzerland

Albert Furrer
Laboratory for Neutron Scattering, Paul Scherrer Institut, 5232 Villigen PSI, Switzerland

The last issue of Swiss Neutron News (No. 42, August 2013) featured an article entitled *50 Years of Swiss Neutron Diffraction Instruments* by Peter Fischer *et al.*, which is complemented here by a chronological summary of the development of neutron spectrometers (i.e., instruments for inelastic neutron scattering) in Switzerland from the early days up to the present. This article is dedicated to the memory of Walter Hälg (1919–2011), the founder of neutron scattering in Switzerland.

HOW IT STARTED

The first Swiss neutron source was the light-water reactor *Saphir* which started operation in the year 1957 with a thermal power of 1 MW, but the thermal neutron flux of about 10^{13} $n\cdot cm^{-2}\cdot s^{-1}$ was not sufficient for neutron spectroscopic experiments. The situation was improved in the year 1960 with the commissioning of the heavy-water reactor *Diorit* (30 MW thermal power) providing a thermal neutron flux of the order of 10^{14} $n\cdot cm^{2}\cdot s^{-1}$. Initially, inelastic neutron scattering experiments were performed with use of a **rotating-crystal time-of-flight spectrometer**, which was transferred in the year 1961 from the Kernforschungszentrum Karlsruhe (Germany) to the reactor *Diorit* by Wolfgang Gläser's group (because of a several years' shutdown of the Karlsruhe reactor). It was left at the disposal of Walter Hälg's group after the restart of the Karlsruhe reactor. The instrument was equipped with a rotating Al monochromator and a series of scintillation detectors. Not much was known at that time about the resolution properties of neutron spectrometers, so that the necessary knowledge had to be acquired by „learning on the job" [1,2]. The spectrometer was completely rebuilt in the year 1967 with improved resolution, intensity and background by using rotating Pb monochromators, He flight paths and He detectors (Fig. 1).

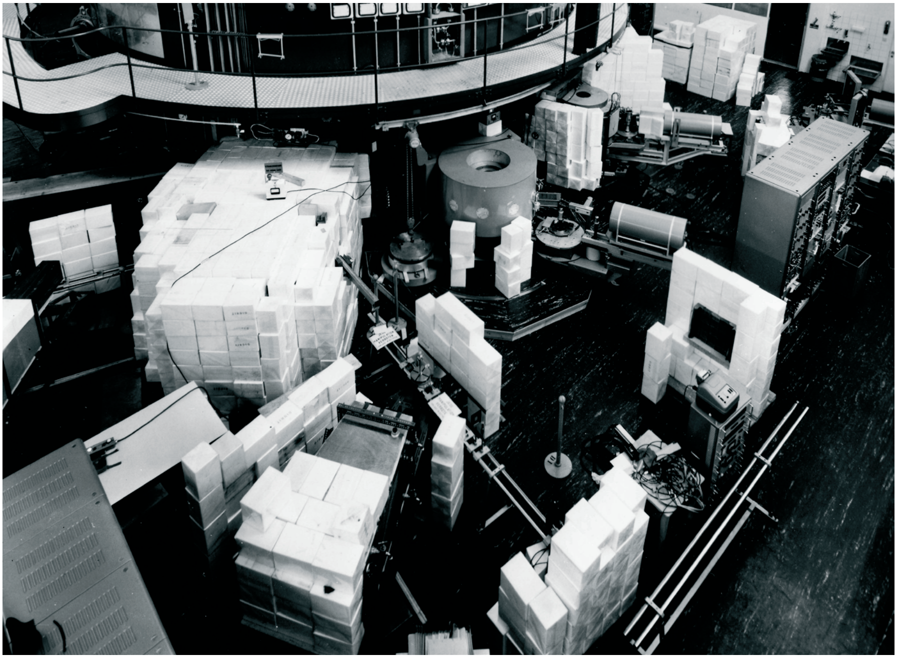

Figure 1: Instruments at Diorit in the year 1967. The rotating-crystal time-of-flight spectrometer is in the foreground. The neighboring instrument is the three-axis spectrometer.

AN INSTRUMENT BASED ON AN ANTI-AIRCRAFT-GUN CARRIAGE

The construction of a **three-axis spectrometer** started in the year 1963, and its installation at the reactor *Diorit* was completed in 1966. The monochromator axis was built up on top of a rotating anti-aircraft-gun carriage provided by the Swiss army (Fig. 2). Both the sample and the analyzer axes were carried along mechanically in a self-supporting manner and driven by cables, which resulted in severe problems due to rather long wiggling times around the final angular positions. Some years later, the „crazy“ cable drives were replaced by a system of tooth wheels.

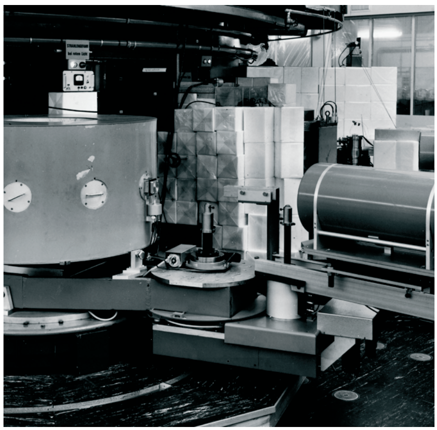

Figure 2: Three-axis spectrometer at Diorit. The monochromator is built on top of a rotating anti-aircraft-gun carriage.

The constant-Q or constant-ω scans had to be programmed on a central computer and fed to the instrument in the form of paper tapes. In order to run the spectrometer over the weekend, several hundred meters of paper tape had to be provided in advance!

THE FIRST STEP INTO POLARIZED NEUTRONS

In 1964 I stepped into neutron scattering to carry out the diploma thesis. My task was to produce **polarized neutrons** and to utilize them for spin-wave measurements. Large fcc $Co_{0.92}Fe_{0.08}$ plates mounted in permanent magnets served as both polarizer and analyzer crystals, and high-frequency spin-flip coils placed inside the guide field were used as π-inverters of the neutron spin. In order to achieve spin turnings by π/2, a spiral-type guide field was manufactured in which the neutron spin adiabatically followed the external magnetic field (Fig. 3). This device is now the most beautiful trophy in my office! The polarized neutron instrument was missing the third axis for energy selection, so that information on the spin waves could only be obtained by measuring the scattering surface away from the Bragg position, a method developed by Elliott and Lowde at the Harwell reactor in the U.K. [Proc. Roy. Soc. 230, 46 (1955)].

MOVING FORTH AND BACK BETWEEN DIORIT AND SAPHIR

In 1970 the reactor *Diorit* was shut down, because the reactor tank had to be replaced. Both the three-axis spectrometer and the rotating-crystal time-of-flight spectrometer were moved to the reactor *Saphir*, whose thermal power was increased to 5 MW in order to make neutron spectroscopic experiments possible. In 1973 the reactor *Diorit* was operational again, and the two spectrometers were moved back from the reactor *Saphir*.

ENTERING THE GRAPHITE AGE

At about the same time the high-flux reactor at the Institut Laue-Langevin (ILL) in Grenoble started to produce neutrons with a thermal flux of about 10^{15} $n{\cdot}cm^2{\cdot}s^{-1}$, *i.e.*, an order of magnitude larger than that of the reactor

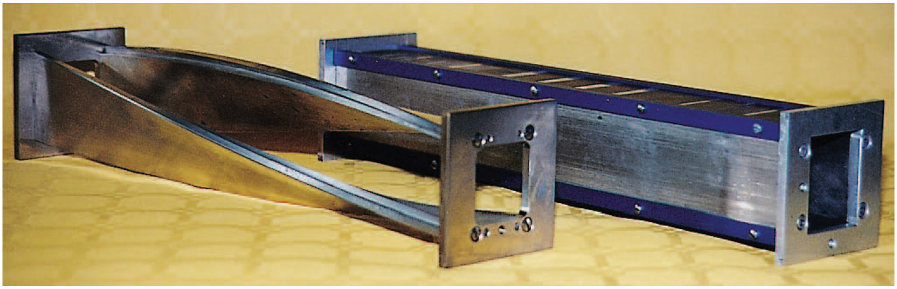

Figure 3: Magnetic guide fields

Diorit. In order to be competitive on an international level, many efforts were undertaken to optimize the flux conditions at the Swiss neutron spectrometers. Motivated by a paper of Tormod Riste (1925–1995) [Nucl. Instrum. Meth. 75, 197 (1969)], a **pyrolitic graphite** plate with an area of 5x5 cm^2 was purchased in 1970 and inserted as monochromator for the three-axis spectrometer, which resulted in an intensity increase by factors between 2 and 5. Some years later vertically bent graphite crystals (with fixed bending) became available, which roughly doubled the intensity without losing resolution. At that time oriented graphite crystals were extremely expensive, contributed to an „explosion" of the laboratory budget and therefore had to be treated very carefully; nevertheless, Willi Bührer (1938–1997) once took the liberty of signing an order with use of the corner of a graphite crystal instead of an ordinary pencil!

THE FIRST „EXOTIC" SPECTROMETER

Another idea realized at the reactor *Diorit* in 1973 was the **MARC** (**M**ulti-**A**ngle **R**eflecting **C**rystal) **spectrometer** based on an instrument concept developed at Risø National Laboratory (Denmark) by Jørgen Kjems [*Neutron Inelastic Scattering*, IAEA, Vienna (1972), p. 733]. In principle, the MARC spectrometer is a conventional three-axis spectrometer, but it differs from the latter by the analyzer and detector system (Fig. 4). The neutrons scattered from the sample are collected over a large range of scattering angles and then energy selected by a large analyzer crystal (with a mosaic spread of several degrees) and by a position- sensitive detector, which allows the simultaneous measurement of a complete energy spectrum. Due to a delay in the provision of the detector electronics, the MARC spectrometer was initially used as a three-axis spectrometer, and only in 1976 it was operated in the desired MARC scheme, thereby demonstrating the expected overall intensity gain by an order of magnitude. The MARC spectrometer was controlled by a PDP 11/10 computer and CAMAC electronics, and the heavy weights were moving on homemade air cushions. At the same time, this „modern" instrument technology was also applied to completely upgrade the „old-fashioned" three-axis spectrometer.

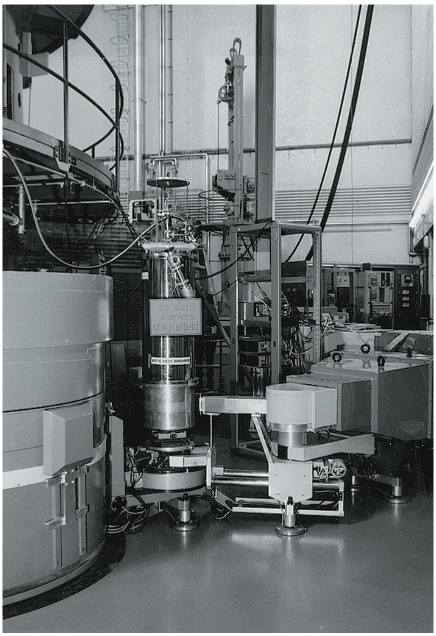

Figure 4: The MARC spectrometer at Diorit

A DEVICE INSPIRED BY THE GREEK MYTHOLOGY

Often single crystals of advanced materials can only be grown with volumes of a few mm^3, which contrasts to the usual size of neutron beams with cross sections in the cm^2 range. In order to make better use of the neutrons at the sample position, our skilled technicians realized a multi-crystal goniometer in the year 1974, following an idea of Bill Buyers (Chalk River National Laboratory, Canada). Up to seven single crystals could be individually adjusted (Fig. 5). The system was manufactured by brass in a rather compact way, suitable for insertion into cryostats. The **multi-crystal goniometer** was called **Hydra**, referring to the multi-headed snake-like monster in the Greek mythology.

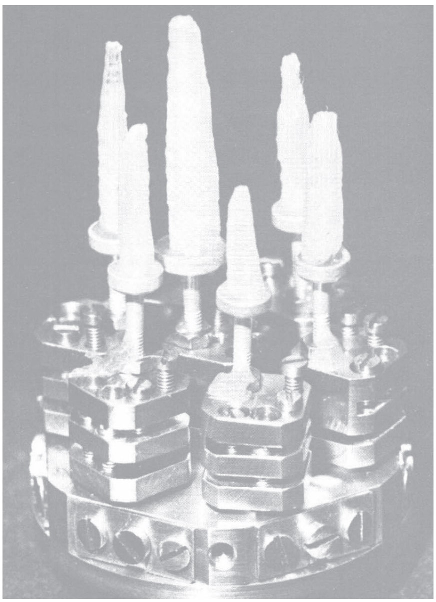

Figure 5: The multi-crystal goniometer Hydra

MOVING AGAIN FROM DIORIT TO SAPHIR

1977 marked the year of the final shutdown of the reactor *Diorit*. In the meantime the experimental hall of the reactor *Saphir* was considerably enlarged in order to provide sufficient room for the neutron scattering activities. However, only four radial beam ports were available, two for neutron diffraction and two for neutron spectroscopy. Therefore only the very successful three-axis and MARC spectrometers could be reinstalled at the reactor *Saphir*, whereas the rotating-crystal time-of-flight spectrometer had to share its fate with the reactor *Diorit*.

A RECIPE TO SURVIVE WITH MODERATE FLUX

Due to the limited flux of the reactor *Saphir* the efforts to optimize the neutron spectrometers were continued. In particular, **the idea of horizontal focusing** proposed at the ILL Grenoble by Reinhard Scherm [Nucl. Instrum. Meth. 143, 77 (1977)] was brought to Swiss perfection. A very flexible system called **Jalousie** (= Venetian blind) was realized (Fig. 6), which was composed of seven individually adjustable goniometer heads [3]. The latter were mechanically coupled to achieve rotations of the outer crystals by ±δ, ±δ2δ ±δ3 with respect to the central one. The three-axis spectrometer was upgraded in the year 1980 with two *Jalousie* systems: For the monochromator high quality and vertically bent graphite crystals were used and for the

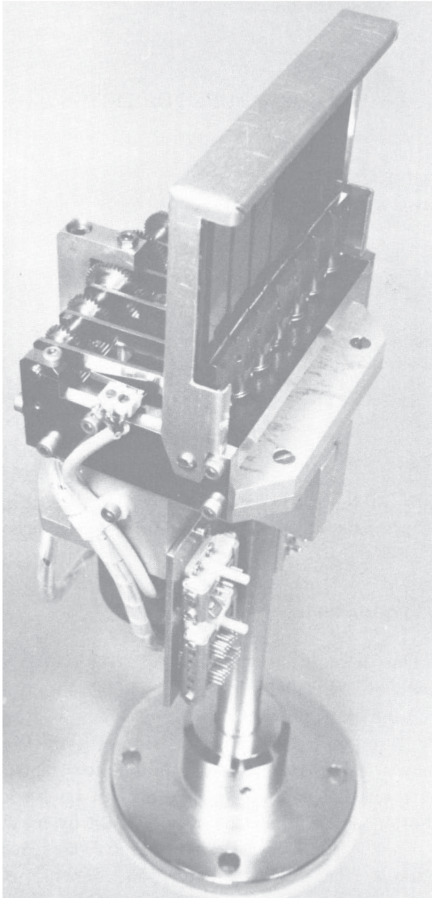

Figure 6: Jalousie monochromator with seven graphite crystals

analyzer medium quality flat ones. An intensity gain factor of the order of 20 resulted from this upgrade without losing energy resolution. In fact, the use of this kind of beam focusing was extremely successful, so that some years later also the MARC spectrometer was transformed into a three-axis spectrometer with a doubly focusing monochromator and a horizontally focusing analyzer.

TO BELIEVE, OR NOT TO BELIEVE, THAT IS THE QUESTION

The international neutron scattering community expressed a tremendous interest in our focusing monochromator and analyzer systems. However, some people were not really enthusiastic about beam focusing. I remember a visit of Gen Shirane (1924–2005), the neutron scattering „guru" of Brookhaven National Laboratory, in the early nineties. He doubted that focusing systems can be operated reliably on a long time scale. In particular, he did not believe that after some hundred thousand measurement scans the angular settings of the individual crystals can be reproduced exactly. Obviously he underestimated the mechanical skill of Swiss technicians! After Gen Shirane's visit we used to categorize three-axis experiments into either „Brookhaven type" (no focusing, low intensity, poor statistics) or „Swiss type" (full focusing, high intensity, excellent statistics).

SQUEEZING MORE NEUTRONS OUT OF SAPHIR

In 1983 the thermal power of the reactor *Saphir* was upgraded from 5 MW to 10 MW. At the same time the dimensions of the reactor beam tubes were doubled from 4×4 cm^2 to 8×4 cm^2 and filled with helium (to avoid intensity loss through scattering from air) [4]. In addition, silicon filters cooled to liquid nitrogen temperature were inserted into the beam tubes to minimize the background. All these measures resulted in an overall intensity gain of the order of 5, which was extremely beneficial for neutron spectroscopic experiments. In fact, the three- axis spectrometers at *Saphir* were fully competitive with those at neutron sources with higher flux. Moreover, for particularly demanding experiments, the head of the reactor *Saphir* sometimes agreed to run the source for a couple of hours beyond the legal limit of 10 MW at a power of 12 MW. Normally a bottle of wine for the reactor crew was the minimum fee for this favor!

SAMPLE ENVIRONMENT: A KEY FOR SUCCESS

Permanent efforts were undertaken to improve the performance of the three-axis spectrometers as well as to extend the sample environment by novel devices. In collaboration with the Nobel Prize winner Alex Müller a uniaxial pressure device for insertion into cryostats and pressures up to 1 Mbar/mm^2 was constructed [5]. For optically active materials a device was developed for performing neutron scattering experiments with simultaneous irradiation by light pulses at low temperatures [6]. In 1992 a very compact analyzer-detector system was taken into operation, which allowed optimal horizontal focusing by properly adjusting both the position and the aperture of the detector (Fig. 7). Moreover, the shielding was optimized such that no enhancement of the background was measured when the detector was moving through the monochromatic beam.

THE SWISS EXILE AT THE ILL GRENOBLE

The „neutron paradise" at *Saphir* did not last forever. In 1992 the thermal power of *Saphir* was reduced to 5 MW, and at the end of 1993 the reactor had to be shut down, mainly for safety reasons, but also in view of the new spallation source *SINQ* which was already in an advanced planning stage. Fortunately, in the early nineties the ILL Grenoble was looking for Collaborating Research Groups (CRG) to operate some of the existing instruments. In 1994 the ILL and the Paul Scherrer Institut (PSI) signed a contract to use the three-axis instrument IN3 in the framework of a CRG to bridge temporarily the neutron gap in Switzerland (Fig. 8). The flux at IN3 (installed at a thermal neutron guide) was rather moderate, but the insertion of a horizontally focusing trumpet between the monochromator and the sample resulted in a significant intensity gain. The CRG operation was terminated in 1998.

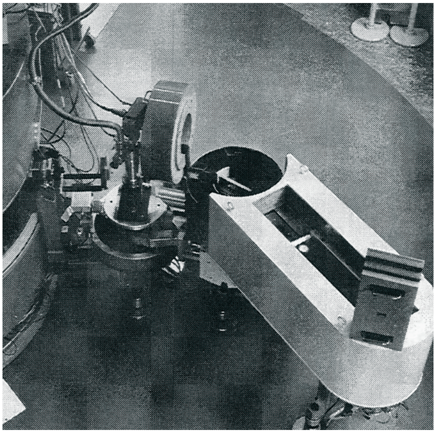

Figure 7: Compact analyzer-detector system of the three-axis spectrometer at Saphir

ENTERING A NEW AGE WITH SINQ

The spallation neutron source *SINQ* produced the first neutrons on December 3, 1996, followed by a commissioning period for the neutron scattering instruments, which are controlled by a standardized electronics and software system [7]. Scheduled user operation started in 1998 with a proton current of 1.6 mA. The first target made of Zircaloy and cooled by heavy water produced a thermal neutron flux of $n=0.6\times10^{14}$ $n\cdot cm^{-2}\cdot s^{-1}\cdot mA^{-1}$. In the year 2000, the target was replaced by a system of lead rods in Zircaloy tubes, which doubled the thermal neutron flux. At the same time, the proton current was increased to 2.0 mA, resulting in a thermal neutron flux of $n=2.4\times10^{14}$ $n\cdot cm^{-2}\cdot s^{-1}$ typical of a medium-flux neutron source.

THREE-AXIS SPECTROMETERS, OF COURSE!

For the first generation of neutron spectrometers, emphasis was led on the use of cold neutrons because of the very efficient cold neutron source sitting close to the target. The **three-axis spectrometer DrüchaL** [**Drü**achsigs am **cha**lte **L**eiter] installed at the cold neutron guide No. 13 (Fig. 9) was ready for inelastic neutron scattering experiments in early 1997, followed some months later by the **three-axis spectrometer TASP**, which mechanically is a copy of DrüchaL, but it has the option to make use of polarized neutrons. Both DrüchaL and TASP are moving on air cushions on a sturdy and maintenance-free granite floor. TASP is located at the end of the cold neutron guide No. 14, thus it can make

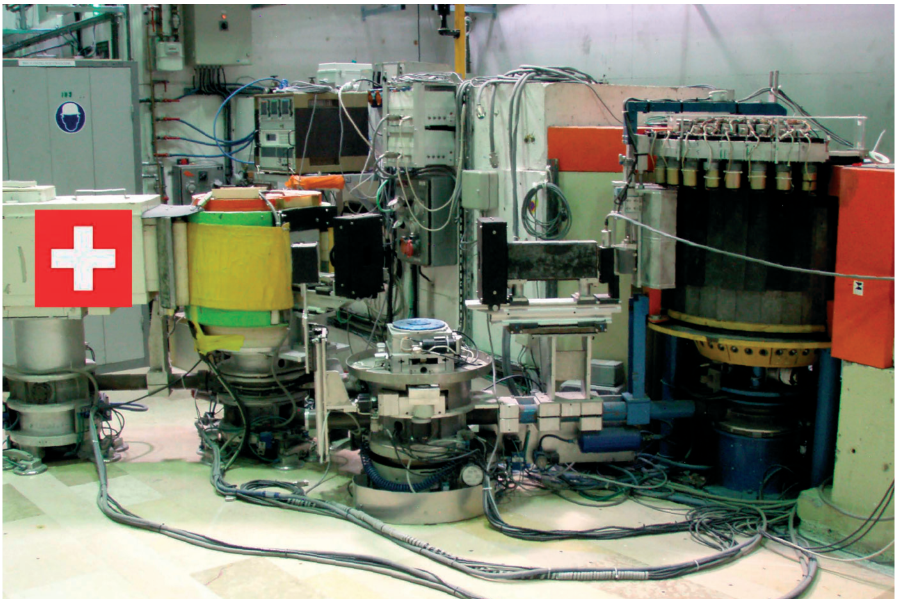

Figure 8: The „Swiss" three-axis spectrometer IN3 at the ILL Grenoble

full advantage of this privileged position by employing collimation or using a Heusler monochromator in the primary beam. An important addition to TASP was made in the year 2008 by the availability of **MuPAD**, which is a **Mu**-metal **P**olarization **A**nalysis **D**evice allowing the arbitrary orientation of a polarized neutron beam, so that spherical neutron polarimetry and xyz polarization experiments can be performed.

TOWARDS HIGH RESOLUTION

The **high-resolution time-of-flight spectrometer FOCUS**, developed in collaboration with Rolf Hempelmann (University of Saarbrücken, Germany) and partly funded by the BMBF (Bundesministerium für Bildung und Forschung, Germany), became operational in 1999 (Fig. 10). FOCUS, located at the end of the cold neutron guide No. 11, is a hybrid crystal-chopper spectrometer with either monochromatic or time focusing option [8,9]. The primary spectrometer consists of three parts. The white incoming neutron beam, reduced in size by a converging guide, is cut into packets by a disk chopper. A Be-filter can be inserted after the disk chopper to suppress higher-order contamination. The neutron packets are then deflected by a horizontally and vertically focusing monochromator equiped with either pyrolitic graphite or MICA [10] crystals, before they are chopped again in a Fermi chopper. The secondary spectrometer consists of detector banks surrounding the sample from +10° to +130°. The initial number of 200 He detectors of rectangular shape was later increased to 375, and a two-dimensional multidetector was added to cover the angular range from -5° to -24°. An oscillating large-angle collimator is inserted between the sample and the detectors in order to avoid scattering from the cryostat. FOCUS opened the way to neutron spectroscopic experiments with energy resolutions down to 10 µeV.

Figure 9: The three-axis spectrometer DrüchaL at SINQ with Willi Bührer (left) and Peter Böni

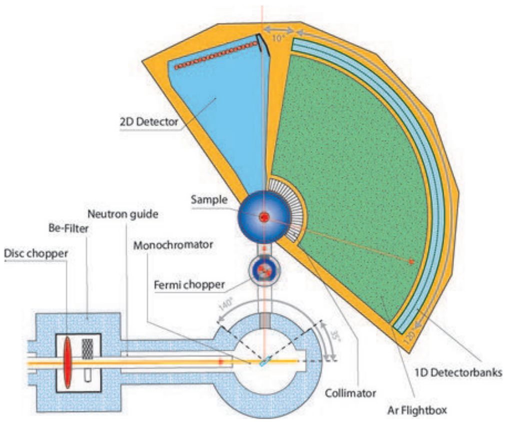

Figure 10: Sketch of the high-resolution time-of-flight spectrometer FOCUS at SINQ

EN VARM VELKOMST HILSEN VED RISØ!

In the year 2001 the Danish neutron scattering group moved its experimental activities from Risø National Laboratory to SINQ. This had consequences for the three-axis spectrometer DrüchaL, whose analyzer and detector parts were exchanged against the **RITA** (**R**e-**I**nvented **T**hree-**A**xis Spectrometer) system developed at Risø. As a result, DrüchaL was renamed as RITA-II (Fig. 11). RITA-II allows very flexible configurations due to the use of a multi- blade analyzer and a position-sensitive detector, but it can also be used in the conventional three-axis mode. A particularly attractive configuration is the monochromatic q-dispersive mode, which provides a mapping in the energy-wavevector space.

HIGH RESOLUTION AT ITS BEST

The second high-resolution neutron spectrometer realized at SINQ is **MARS** (**M**ulti-**A**ngle **R**eflecting Crystal **S**pectrometer) [11], an inverted time-of-flight backscattering spectrometer similar to IRIS at the spallation source ISIS (U.K.). MARS is situated at the cold neutron guide No. 15 in an extension of the guide hall finished in 2004, and user operation started in 2007. Five choppers define the narrow energy range of the incoming neutrons. The secondary spectrometer merges alternating diffraction and inelastic units, and the final neutron energy is determined by reflection from five large, moveable analyzer banks equiped with MICA crystals. The corresponding ^{3}He detector tubes are moveable as well around the near backscattering position (Fig. 12). MARS boasts high resolution over a large

Figure 11: The three-axis spectrometer RITA-II at SINQ

energy range, reaching 1 μeV at the elastic line. Unfortunately, MARS was shut down in 2013 for several reasons.

CLIMB UP THE EIGER!

The youngest member of neutron spectrometers at SINQ is the three-axis spectrometer **EIGER** (**E**nhanced **I**ntensity, **G**reater **E**nergy **R**ange) utilizing thermal neutrons, thereby expanding the available energy range for neutron spectroscopy in a substantial manner. EIGER started user operation in the year 2011 (Fig. 13). It is situated at the thermal beam port No. 82 equipped with a sapphire filter (to suppress neutrons with energy >80 meV) and a focusing guide, which is beneficial for both high flux and low background. A particular feature is the monochromator shielding built from non-magnetic materials, so that high-field cryomagnets can be used.

WHAT CAN BE LEARNED?

Looking back to fifty years of activities in the development of neutron spectrometers in Switzerland, I come to two major conclusions:

1. The time needed for building a new spectrometer, i.e., the time from the idea to the final realization, has been increasing substantially. I became aware of the fascinating MARC principle during a visit at Risø in late 1970, and already in early 1973 we had a MARC spectrometer operational at the reactor *Diorit*. On the other hand, the feasibility study for MARS was completed in 1997, and in the same year an international expert committee gave a strong recommendation to realize MARS, but the project was completed only in 2007! Obviously much time is needed today to overcome all the „hurdles" (technical feasibility study, scientific case, reports by experts, financial planning and sponsorship, availablity of technical manpower)

Figure 12: Analyzer and detector banks of the backscattering spectrometer MARS at SINQ

towards the final commissioning of the instrument.
2. The well known saying **„every neutron is a good neutron"** has been repeatedly verified. Inelastic neutron scattering at medium-flux neutron sources like *Saphir*, *Diorit* and SINQ can be absolutely competitive with the conditions offered at high-flux neutron sources, provided that clever people are around who persistently try to incorporate innovative ideas into the spectrometers, with the aim to transport as many (useful) neutrons as possible to the detector.

PREDICTING THE FUTURE?

In order to maintain as well as to extend the present level of neutron spectroscopy in Switzerland, instrument improvements and novel possibilities should be permanently envisaged:

1. **The SINQ neutron guides**, designed and realized twenty years ago as the most efficient guide system at that time, urgently need an upgrade now. Novel ballistic guides are able to increase the flux at many instrument positions by almost an order of magnitude [12].
2. **Focusing** some neutron beams down to the mm^2 range is another must to efficiently perform experiments on small samples (e.g. in high-pressure cells) [13].
3. The project **CAMEA** (**C**ontinuous **A**ngle **M**ultiple **E**nergy **A**nalysis) constitutes the ultimate step from TAS via MARC and RITA to a new generation of highly efficient three- axis spectrometers.
4. **Polarization devices** have proven to be most useful assets also for spectrometers [14].
5. Having the world's most powerful ultracold neutron source operational at PSI, the idea of **phase-space transformation** [15,16] might have a revival to deliver thermal neutrons by up-scattering, providing fluxes comparable to today's best thermal time-of-flight spectrometers, but with considerably better energy resolution.
6. Finally, and as a surprise, SINQ is still missing the **neutron spin-echo technique**!

Figure 13: The thermal three-axis spectrometer EIGER at SINQ

Ein Mann, der recht zu wirken denkt,
muss auf das beste Werkzeug halten

Johann Wolfgang von Goethe, Faust, Vorspiel (Direktor)

A bibliography of articles published with respect to the instrumental development of neutron spectrometers in Switzerland:

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Announcements

SGN/SSDN MEMBERS

Presently the SGN has 198 members. Online registration for new members of our society is available from the SGN website:
http://sgn.web.psi.ch

SGN/SSDN ANNUAL MEMBER FEE

The SGN/SSDN members are kindly asked to pay their annual member fees. At the last general assembly of the society, the fee has been increased from CHF 10.- to **CHF 20.-**. It can be paid either by bank transfer or in cash during your next visit at PSI. The bank account of the society is accessible for both Swiss national and international bank transfers. The coordinates are as follows:
Postfinance: 50-70723-6 (BIC: POFICHBE), IBAN: CH39 0900 0000 5007 0723 6

The SGN is now an organization with tax charitable status. All fees and donations payed to the SGN are now **tax deductible**.

YOUNG SCIENTIST PRIZE OF THE SWISS NEUTRON SCATTERING SOCIETY

At the general assembly 2013, it was decided that the SGN will sponsor a prize for young scientists using neutrons as an important probe. The prize will comprise CHF 1000 and will be awarded for the first time in 2014. The announcement of the prize can be found on page 26 [Young Scientist Prize of the Swiss Neutron Scattering Society].
The prize will be awarded during the neutron scattering session of the meeting of the Swiss Physical Society taking place in Fribourg, June 30th – July 2nd, 2014.

PSI FACILITY NEWS

PSI launched a **quarterly electronic newsletter** featuring recent news, events and scientific highlights of the three major PSI user facilities SLS, SINQ and SμS. The online version of the recent edition is available here:
http://www.psi.ch/info/facility-news

SINQ CALL FOR PROPOSALS

The next deadline for the submission of beam time requests for the Swiss spallation neutron source 'SINQ' (http://sinq.web.psi.ch) will be: **May 15, 2014**

NEUTRON BEAM TIME AT SNS FOR THE SWISS NEUTRON COMMUNITY

An actively shielded 16 Tesla magnet has been realized at the Spallation Neutron Source SNS in Oak Ridge, USA, as a collaboration of the Swiss neutron community and SNS. In return, beam time is available at SNS for Swiss users. Swiss neutron scatteres are therefore encouraged to apply for beamtime at SNS.

REGISTRATION OF PUBLICATIONS

Please remember to **register all publications either based on data taken at SINQ, SLS, SμS or having a PSI co-author** to the Digital User Office: https://duo.psi.ch. Please follow the link 'Publications' from your DUO main menu.

OPEN POSITIONS AT ILL

To check the open positions at ILL please have a look at the following ILL-Webpage: http://www.ill.eu/careers

PHD POSITIONS AT ILL

The PhD program of the Institut Laue-Langevin, ILL, is open to researchers in Switzerland. The contact person at ILL is Anne-Claire Dupuis (PhD@ill.eu). The Swiss agreement with the ILL includes that ILL funds and hosts one PhD student from Switzerland.

SWISS PHD POSITION AT ILL

ILL funds and hosts one PhD student from Switzerland. This position will become vacant in 2015, and a call for a new PhD grant can be found on page 24 [Call for PhD grant at ILL].

Minutes of the SGN/SSDN General Assembly 2013

Date/Location: *November 13, 2013, Paul Scherrer Institut, main auditorium*

Start: *17:00*

End: *18:00*

Participants: *19 members of the society*

1. WELCOME

The president of the SGN/SSDN, Henrik Ronnow, welcomes the participants to the general assembly 2013.

2. MINUTES OF THE GENERAL ASSEMBLY 2012

The minutes of the general assembly of the SGN/SSDN from 29.10.2012, published in Swiss Neutron News #41 are accepted without objections.

3. ANNUAL REPORT OF THE CHAIRMAN

H. Ronnow reports on the activities of the SGN/SSDN in the year 2013:

a) An aperitif was sponsored by the Society at the PSI Summer School in Zuoz, August 17–23, 2013 (Materials – structure and magnetism).
b) Two new issues of Swiss Neutron News have appeared in February and August 2013.
c) The SGN/SSDN has presently 199 members.
d) An application for the tax charitable status of SGN has been filed to the canton of Aargau. The application has been accepted the day of the assembly, but this was not known at the assembly.

4. REPORT OF THE TREASURER

The annual balance sheet 2012 is presented: Assets SGN/SSDN on 1.1.2012: **SFr 3692.54**

	Revenues [SFr]	Expenses [SFr]
Membership-fees (cash box)	70.00	
Membership-fees (postal check acc.)	200.00	
Donations (cash box)	0.00	
Interest	2.90	
Total expenses - Expenses PC account: 36,00		36.00
Total	272.90	36.00

Net earnings 2012:	**SFr 236.90**	
Assets SGN/SSDN on 31.12.2012:	**SFr 3.929.44**	

Balance sheet 2012:	**Assets [SFr]**	**Liabilities [SFr]**
Postal check account	3.370.94	
Cash box	558.50	
Assets on 31.12.2012	**3.929.44**	

5. REPORT OF THE AUDITORS

Bericht der Revisoren

Die Rechnungsrevisoren haben die Belege, die Abrechnungen und die Bilanz für das Jahr 2012 geprüft und für in Ordnung befunden!

Datum	Dr. M. Zolliker, PSI	25.01.13 Datum	Dr. K. Krämer, Uni Bern

Both Auditors (K. Krämer and M. Zolliker) have examined the bookkeeping and the balance 2012. They have accepted it without objection. The participants therefore unanimously vote for a release of the SGN/SSDN board.

6. BUDGET 2014

The president presents the following proposal for the budget 2014:

	Receipts [SFr]	Expenditures [SFr]
member fees	400.00	
interest	0.00	
fees PC account		40.00
Summer School aperitif 2014		600.00
Total	400.00	
balance 2014	-240.00	

The participants accept the budget proposal unanimously.

In the course of a lively discussion about the budget and its use, three resolutions are made:

1) It is proposed that SGN funds a thesis prize for excellent PhD theses using neutrons as an important probe. The prize will comprise CHF 1000 and will be awarded for the first time in 2014. Three experts will form the selection committee. A clear majority of the present SGN members accepts this.
2) So as not to strain the budget too much, the thesis prize will be awarded every other year and will alternate with sponsoring an apero at the PSI summer school. A marginal majority accepts this proposal.
3) The membership fee is increased from CHF 10 to CHF 20 per year, which will help to collect the necessary funding for the thesis prize. A majority accepts this proposal.

7. ELECTION OF A NEW BOARD MEMBER

Livia Bove (EPFL) is proposed as new board member by the SGN board. A clear majority of the present SGN members accepts the proposal. The SGN board now consists of Prof. Henrik Ronnow (president), Dr. Livia Bove, Dr. Michel Kenzelmann, and Dr. Urs Gasser (secretary). The term of this board ends in 2015.

8. NEWS FROM ENSA (H. RONNOW)

a) The last ENSA meeting took place in Zaragozza, Spain (Nov. 5–6, 2013). ENSA is in the process of finding its role to contribute to the future European neutron landscape. E.g. it is being discussed how ENSA should contribute to ESS. Also, it is being discussed how ENSA can become the voice of all the members. At present, ENSA is dominated by the neutron facilities and the funding bodies.
b) Concerning the future European neutron landscape including ESS, sacrifices at other neutron sources may have to be made

when ESS becomes operational. Where and how such sacrifices should / could be made needs to be discussed. Suggestions regarding this issue are welcome!

c) The PIK reactor near Gatchina, Russia, may be realized as a common project of Russia and Germany, which may reduce the commitment of Germany for ESS and other European sources. This issue is related to point b) above, and SGN should reach a clear opinion about it.

d) The term of Michael Steiner as ENSA chairman will end in 2014. Proposals for the nomination of his successor are welcome.

e) The next European Conference on Neutron Scattering (ECNS) will be organized in Zaragoza, Spain, 30.8. – 4.9.2015.

9. NEWS FROM ILL (K.N. CLAUSEN)

Kurt N. Clausen as the Swiss representative in the ILL Scientific Council (SC) reports on the 89th Scientific Council meeting:

a) The ILL reactor is still in the 10 month shutdown. It is planned to again become operational in June 2014, and 2.5 cycles are planned for 2014. The shutdown work is on schedule. Four reactor cycles are planned for 2015.

b) In 2014, most members of the Scientific Council will be reelected, also a new chairman will be elected. Kurt Clausen's term is ending, and Christian Rüegg will become the Swiss representative.

c) As the 3rd "Millennium" program, ILL plans program "Endurance" for the time frame 2016–2022 with a volume of about 50 M€. It may comprise the replacement of about eight instruments. The program is, however, not yet funded.

d) The ILL is negotiating new contracts with the member countries. The actual proposal of ILL is not acceptable for Switzerland, as it includes a new flat rate plus money for beam time, which would cut the beam time for Switzerland in half, if the Swiss contribution remains constant. The negotiations of the State Secretariat for Education, Research and Innovation with ILL are continuing.

e) Russia may become a member of ILL. The implications for the future of ILL and the PIK reactor near Saint Petersburg are to date unclear.

10. NEWS FROM SINQ (CH. RÜEGG)

a) In 2013, SINQ has again received a large number of proposals, about 400. About 1000 researchers have visited SINQ for experiments; most of them come twice a year.

b) 54% of the beam time is used by Swiss users. The largest Swiss users are PSI (70%) and ETH Zurich (16%).

c) Two instrument upgrades have been founded: Trics will be replaced by the new single crystal diffractometer ZEBRA funded by SNF, PSI, and UniFR. RitaII will be upgraded with a new multi-analyzer CAMEA funded by SNF and EPFL.

d) The planning phase for a possible upgrade of SINQ, named $SINX^2$, has been started. $SINX^2$ is planned to be realized in five to ten years from now and is planned to have a volume of about 30 MCHF. The neutron source, the guides, and the instruments including detectors may be optimized to increase the number of useful detected neutrons by a factor of 10 to 100.

11. NEWS FROM ESS (CH. RÜEGG)

a) The European Spallation Source (ESS) is planned to be built in Lund, Sweden, and to become operational in 2019 with 7 instruments and to have 22 instruments by 2025. 17 European countries including Switzerland are involved. The construction is planned to cost 1.8 B€.
b) Switzerland has signed a Momorandum of Understanding (MoU) for the realization of ESS in 2012 and has invested 2 MCHF for pre-construction activities.
c) In November 2012, the Swiss parliament has approved a budget of 35 MCHF as the Swiss contribution for the construction of ESS.
d) Switzerland is involved in the design of the moderator tank and the shielding with the ESS Target Directorate.
e) Switzeralnd continues to cooperate with Denmark regarding intrument designs. The Swiss-Danish work packages include an extreme environment spectrometer (CAMEA), a focusing reflectometer (Selene), a compact chopped SANS (BioSANS), a hybrid diffraction and SANS instrument (HEIMDAL), neutron optics and background simulations, and a neutron imaging instrument.

12. MISCELLANEOUS

H. Ronnow points out that the ILL PhD program is open to researchers in Switzerland. The contact person at ILL is Anne-Claire Dupuis (PhD@ill.eu).

Furthermore, ILL funds and hosts a PhD student from Switzerland. This position will become available in 2014. A call to again fill this position will be sent to all SGN members by email and is also presented in the next issue of Swiss Neutron News.

U. Gasser
December 2013

Call for PhD grant at ILL

Switzerland is entitled to send one PhD student to ILL for the duration of the PhD project. We hereby call for proposals to fill this position.

The student will be employed and financed by the ILL PhD program. Besides working with the Swiss university supervisor defined in the proposal, each thesis student will work with an ILL supervisor. The ILL supervisor will be responsible for ensuring that, from a practical and technical point of view, the thesis progresses under the appropriate conditions during the student's stay at ILL. He/she shares responsibility for the scientific aspects of the student's work with the university supervisor. The university supervisor has ultimate scientific and administrative responsibility for the thesis (for more information please go to http://www.ill.eu/science-technology/phd-students/phd-recruitment/).

TYPE OF RESEARCH

Proposals from all areas of science using neutrons are welcome. The ILL PhD Program focuses currently on four fields of science: Nanoscience, Soft Condensed Matter, Biology, and Magnetism. However, high-quality proposals from other fields will also be considered.

REQUIREMENTS

The application has to be submitted by the direct supervisor of the PhD student. Any researcher working in Switzerland with the authorization to supervise PhD students is entitled to participate. The criteria for evaluation are the scientific quality and originality of the project as well as qualifications and track record of the applicant (supervisor) and the designated PhD student (if already known).

The application consists of the following four documents and a cover letter containing the name of the proposed supervisor at ILL and a statement that the ILL supervisor is informed about the proposal and willing to act as a supervisor:

A.) Summary of the proposal (max. 1 page)

B.) Proposal (max. 5 pages) structured as follows:

1. Abstract
2. Background
3. State of the Art and Objectives
4. Detailed Research Plan (including a time table)
5. Importance and Impact
6. References

C.) CV of Applicant (Supervisor) (max. 2 pages) plus publication list of the past 5 years

D.) CV of PhD candidate (if available)

Please convert the documents into pdf (max. size 2 MB per document; nomenclature: A_LastNameApplicant.pdf, B_LastNameApplicant.pdf etc.) and send it to the secretary of the Swiss Neutron Scattering Society,
Dr. Urs Gasser: urs.gasser@psi.ch

Deadline: October 31st, 2014
Decision: December 2014
Starting date of the Project: January 2015
Duration: 3 years.

Young Scientist Prize of the Swiss Neutron Scattering Society, sponsored by SwissNeutronics

The Swiss Neutron Scattering Society hereby announces the call for nominations for the 1st Young Scientist Prize of the Swiss Neutron Scattering Society.

The prize will be awarded to a young Scientist in recognition of a notable scientific achievement in the form of a PhD thesis. The science should include the use of neutron scattering, and eligible nominees should have a clear affiliation with Swiss Neutron Scattering (be member of the Swiss Neutron Scattering Society, be based in Switzerland, or have conducted experiments at Swiss neutron facilities). The PhD must have been awarded within two years of the announcement of this Call. The prize amounts to 1'000 CHF and is sponsored by SwissNeutronics. The prize will be awarded at the Neutron Scattering Session of the Swiss Physical Society Meeting June 30 – July 2, 2014 at the University of Fribourg, where the recipient will be expected to give a presentation.

Nominations for the prize should be submitted to the Swiss Neutron Scattering Society, Dr. Urs Gasser: (Urs.Gasser@psi.ch). The deadline for nominations is April 30, 2014. Nominations should include:

- A nomination letter including the motivation for the award
- A CV and publication list
- Digital copy of the nominated work (PhD thesis)
- Letter documenting the acceptance of the nomination by the nominee
- Letters of support from authorities in the relevant field are accepted

Nominations for the prize will be treated confidentially. Nominations for the prize will be evaluated by a Selection Committee appointed by the board of the Swiss Neutron Scattering Society. The nominations will be acknowledged, but there will be no further communication.

PAUL SCHERRER INSTITUT

International Society for Neutron Radiology
Established 1996

10th World Conference on Neutron Radiography

WCNR-10

Grindelwald, Switzerland, October 5–10, 2014

WCNR-10 will be the global forum to communicate latest developments in the held of Neutron Imaging. It is intended as the international platform to exchange knowledge about methodical improvements, facility installations and upgrade, usage for scientific and industrial related topics and links to related fields like neutron scattering and X-ray imaging.
The WCNR-10 will be held to exchange the experience among the facility operators and to bridge between the advanced and the developing laboratories for further improvements.

Topics

- Beamlines
- Instrumentation
- Method development
- Data processing
- Applications

Local Organisation Committee

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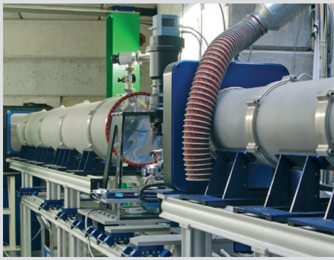
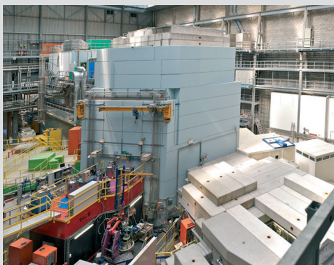


Further information on the conference web page:
www.psi.ch/wcnr10
Contact: wcnr10@psi.ch

In cooperation with:

IAEA International Atomic Energy Agency
EUROPEAN SPALLATION SOURCE



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VOLUME GRAPHICS

Conferences and Workshops 2014–2015

(an updated list with online links can be found here: http://www.psi.ch/useroffice/conference-calendar)

APRIL 2014

- BCA Spring Meeting 2014, April 7–10, 2014, Loughborough UK
- Computational Structural Biology - From Data to Structure to Function: EMBL-EBI Training Course, April 7–11, 2014, Cambridge, UK
- Electron Crystallography School – Introduction to electron diffraction tomography, April 7–11, 2014, Darmstadt Germany
- Polymers in Photovoltaics 2014, April 8–10, 2014, Cologne Germany
- Macromolecular Crystallography School 2014: from Data Processing to Structure Refinement and Beyond, April 8–16, 2014, San Carlos Brazil
- The Physics of Soft and Biological Matter, April 14–16, 2014, Cambridge, UK
- Ion Beam Analysis Techniques in Materials Science (from eV to MeV), April 17, 2014, London, UK
- 2014 MRS Spring Meeting and Exhibit, April 21–25, 2014, San Francisco, CA, USA
- CRYSTAL29. SCANZ Conference, April 22–25, 2014, Gold Coast QLD Australia
- Molecular & Ionic Clusters, April 26–27, 2014, Lucca Italy
- RapiData 2014 - Rapid Data Collection and Structure Solving at the NSLS: A Practical Course in Macromolecular X-ray Diffraction Measurement, April 27 – May 2, 2014, Brookhaven National Laboratory, Upton, NY USA
- International School on Fundamental Crystallography 2014, April 27 – May 9, 2014, La Plata, Argentina
- IYCr South Asia Summit Meeting on Vistas in Structural Chemistry, April 28 – 30, 2014, Karachi, Pakistan
- 41st ICMCTF. International Conference on Metallurgical Coatings and Thin Films, April 28 – May 2, 2014, San Diego CA USA
- XII School of Neutron Scattering 'Francesco Paolo Ricci': Introduction to the theory and techniques of neutron scattering and applications to Cultural Heritage, April 30 – May 9, 2014, Erice (Sicily), Italy

MAY 2014

- BNS 2014: Second Baltic Neutron School, May 4–8, 2014, Tartu, Estonia
- MDANSE2014 – school: Molecular Dynamics (and Lattice Dynamics) to Analyse Neutron Scattering Experiments, May 9–10, 2014, Grenoble, France
- Hot Topics in Contemporary Crystallography, May 10–15, 2014, Sibenik, Croatia
- QENS and WINS 2014: 11th International Conference on Quasielastic Neutron Scattering and 6th International Workshop on Inelastic Neutron Spectrometers, May 11–16, 2014, Autrans, France
- ISSC14: International Summer School of Crystallography 2014, May 11–17, 2014, Hamburg, Germany
- European Summer School on "Scattering Methods Applied to Soft Condensed Matter", May 16–23, 2014, Carcans-Maubuisson, Gironde, France
- EMBO EMBL Symposium on Molecular Machines: Lessons from Integrating Structure, Biophysics and Chemistry, May 18–21, 2014, Heidelberg, Germany
- CETS 2014: 8th Central European Neutron School on Neutron Scattering, May 19–23, 2014, Budapest, Hungary
- 2014 MaMaSELF Status Meeting, May 21–26, 2014, Rigi Kulm, Switzerland
- Discovering emergent phenomena and magnetism with neutron and x-ray powder diffraction at the 2014 American Crystallographic Association Meeting, May 24–28, 2014, Albuquerque, NM, USA
- Structural Basis of Pharmacology: Deeper Understanding of Drug Discovery through Crystallography, May 30 – June 6 2014, Erice, Italy

JUNE 2014

- ACNS 2014: American Conference on Neutron Scattering, June 1–5, 2014, Knoxville, TN, USA
- μSR2014: 13th International Conference on Muon Spin Rotation, Relaxation and Resonance, June 1–6, 2014, Grindelwald, Switzerland
- PSND 2014: International Workshop on Position Sensitive Neutron Detectors, June 2–4, 2014, Jülich, Germany
- Bachelor summer program of the Université Joseph Fourier in Grenoble, June 2 – July 13, 2014, Grenoble, France
- International EXPO/SIR workshop on crystal structure solution (powders and single crystal): theory and practice, June 10–13, 2014, Bari, Italy
- 16th Annual National School on Neutron and X-ray Scattering, June 14–28, 2014, Argonne (IL) and Oak Ridge (TN) National Labs, USA
- NGSCES 2014: The New Generation in Strongly Correlated Electron Systems, June 16–20, 2014, Nice, France
- Fifth Workshop on Neutron Scattering Applications in Structural Biology, June 16–20, 2014, Oak Ridge, TN, USA
- 1st South East European Conference on Sustainable Development of Energy, Water and Environment Systems, June 29 – July 4, 2014, Ohrid, Republic of Macedonia SDEWES

JULY 2014

- 11th European SOFC and SOE Forum, July 1–4, 2014, Lucerne, Switzerland
- SCES 2014: Strongly Correlated Electron Systems 2014, July 7–11, 2014, Grenoble, France
- SXNS13: International Conference on Surface X-ray and Neutron Scattering, July 7–11, 2014, Hamburg, Germany
- International Conference on Highly Frustrated Magnetism 2014, July 7–14, 2014, Cambridge, UK
- Neutrons and Food 2014, July 9–11, 2014, Paris, France
- NIST 2014 Summer School on Methods and Applications of Small Angle Neutron Scattering and Neutron Reflectometry, July 14–18, 2014, Gaithersburg, MD, USA
- ICSOS'11: 11th International Conference on the Structure of Surfaces, July 21–25, 2014, Coventry, UK
- 9th Liquid Matter Conference, July 21–25, 2014, Lissabon, Portugal

AUGUST 2014

- IUCr 2014, August 5–12, 2014, Montreal, Quebec, Canada
- LT27: 27th International Conference on Low Temperature Physics, August 6–13, 2014, Montreal, Buenos Aires, Argentina
- 13th PSI Summer School on Condensed Matter Research: Exploring time, energy and length scales in condensed matter, August 9–15, 2014, Zug, Switzerland
- PSI Summer School on Particle Physics: More Than Higgs - Effective Theories for Particle Physics, August 17–23, 2014, Zuoz, Switzerland
- FEL 2014: 36th International Free-Electron Laser Conference, August 25–29, 2014, Basel, Switzerland
- 1st European Crystallography School 2014, August 31 – September 5, 2014, Pavia, Italy

SEPTEMBER 2014

- 35th Risoe International Symposium on Materials Science: New Frontiers of Nanometals, September 1–5, 2014, Roskilde, Denmark
- SGK/SSCr Annual Meeting 2014, September 9, 2014, Neuchatel, Switzerland
- 2nd International Conference on Science at Free Electron Lasers - Science at FELs 2014, September 14–17, 2014, PSI Villigen, Switzerland
- XTOP 2014: The 12th Biennial Conference on High-Resolution X-Ray Diffraction and Imaging, September 14–19, 2014, Grenoble, France
- ICCBM15: 15th International Conference on the Crystallisation of Biological Macromolecules, September 14–20, 2014, Hamburg, Germany
- 92nd Annual Meeting of the German Mineralogical Society, September 21–24, 2014, Jena, Germany
- MSE congress 2014: Materials Science and

Engineering, September 23–25, 2014, Darmstadt, Germany

- ICANS XXI: 21st Meeting of the Collaboration on Advanced Neutron Sources, September 29 – October 3, 2014, Mito, Ibaraki, Japan

OCTOBER 2014

- WCNR10: 10th World Conference on Radiography, October 5–10, 2014, Grindelwald, Switzerland
- 3rd JCNS Workshop on neutron instrumentation: From spallation to continuous neutron sources: a positive feedback on neutron instrumentation, October 19–23, 2014, Tutzing, Germany
- 12th International Conference on X-Ray Microscopy, October 26–31, 2014, Melbourne, Australia

JUNE 2015

- 5th European PEFC and H2 Forum, June 30 – July 3, 2015, Lucerne, Switzerland

JULY 2015

- ICM2015: 20th International Conference on Magnetism, July 5–10, 2015, Barcelona, Spain

SEPTEMBER 2015

- SAS2015: 16th International conference on Small-Angle Scattering, September 13–18, 2015, Berlin, Germany

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